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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,077	11/30/2001	Dae K. Kim	37219-01	4554

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EXAMINER

NGUYEN, TAM M

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 03/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

<b>Office Action Summary</b>	<b>Application No.</b> 09/998,077	<b>Applicant(s)</b> KIM ET AL.	
	<b>Examiner</b> Tam M. Nguyen	<b>Art Unit</b> 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 December 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 6, 7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 6, 7, and 9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____  |

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## DETAILED ACTION

### *Response to Amendment*

The objection to claim 8 and 19 is withdrawn by the examiner in view of the amendment filed on December 18, 2003.

The rejection of claims 5, 8, 15, 18 under 35 USC § 112 is withdrawn by the examiner in view of the amendment filed on December 18, 2003.

The rejection of claims 1-17, 19 and 20 under 35 USC § 103 is withdrawn by the examiner in view of the amendment filed on December 18, 2003. A new rejection follows.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 6, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (JP-61050929) in view of Kaminsky et al. (6,124,517).

Yamamoto discloses a process for removing acetylene compounds (including phenylacetylene) from a mixture of styrene (aromatic monomer) by contacting the mixture with an adsorbent comprising zero-valent copper and/or silver (metallic metal) that is supported by an alumina carrier. The liquid mixture of styrene is contacted with the adsorbent at liquid hourly space velocities of from 0.1 to 80 hr<sup>-1</sup> and at a temperature of from 0 to 100° C. The liquid mixture does not contain hydrogen, mercury, arsenic, and sulfur components. Yamamoto also discloses that no acetylene compounds are detected in the styrene product. (See of page 5, the next to the last line of page 7; page 7, lines 3-5; page 6, lines 19-20; example 5)

Yamamoto does not specifically disclose that the adsorbent has a high surface area. However, Kaminsky discloses a high surface area adsorbent having BET in a range of from about 80 to about 500 square meters per gram (see col. 8, lines 28-42). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by using a high surface area as taught by Kaminsky because such surface area is effective to adsorb acetylene compounds from a hydrocarbon mixture.

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Yamamoto does not specifically disclose that the styrene mixture comprises more than about 100 ppm of phenylacetylene. However, Yamamoto discloses that acetylene compounds can be eliminated even when their concentration is in the range of  $10^{-4}$  to 10 wt. % (10 ppm – 100,000 ppm). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by utilizing a styrene mixture comprising more than about 100 ppm of phenylacetylene as claimed because one of skill in the art would use a mixture which comprises acetylene compound in any amount of from 10 to 100000 ppm including the claimed amount.

Yamamoto does not disclose that the support has a dispersed a metal. However, Kaminsky discloses a method of making an adsorbent by dispersing metal on the support (see Kaminsky col. 7, lines 62-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by dispersing metals on the support as taught by Kaminsky because Yamamoto discloses that no specific limitation is imposed on the method for preparing the adsorbent (see Yamamoto lines 3-4 of page 6).

Yamamoto does not disclose the regeneration step of the adsorbent. However, Kaminsky discloses a regeneration step of adsorbent by using hydrogen gas (see Kaminsky col. 12, lines 26-30). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by regenerating the adsorbent as taught by Kaminsky because the adsorbent of Yamamoto is chemically and physically similar to the Kaminsky adsorbent, so it would be expected that hydrogen would be an effective component to remove acetylene compounds from the adsorbent of Yamamoto.

Yamamoto does not specifically disclose that the adsorbent comprises 0.01 to about 10 wt. % of metal. However, Yamamoto discloses that the adsorbent contains about 1 to 48 wt. % of metal. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by employing the claimed amount of metal because one of skill in the art would use any amount of metal from 1-48 wt. % including the claimed amount (see lines 2-3 of page 6). It is noted that when one of skill selects an adsorbent that comprises about 9 wt. % of metal, the adsorbent would comprise about 91 wt. % of  $\gamma$ -alumina (see Yamamoto; the last line of page 5, line 2 of page 6, and the next to the last line of page 7)

Yamamoto does not disclose that the metal dispersed on the support material is palladium. However, Kaminsky discloses that the metal dispersed on the support is selected from copper, silver, and palladium (see Kaminsky; col. 7, lines 62-67). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by using palladium instead of copper or silver because palladium has an equivalent function as copper or silver in the adsorbent.

Yamamoto does not disclose that metal dispersion is measured by carbon monoxide chemisorption method. However, Kaminsky disclose that the dispersion is measured by carbon monoxide technique (see col. 9, lines 7-17). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Yamamoto by measuring the metal dispersion value by the method as taught by Kaminsky because such method is effective to analyze how much metal in the adsorbent. Since the Yamamoto adsorbent contains about 1 to 48 wt. % of metal (see lines 2-3 of page 6), it would be

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expected that the modified Yamamoto adsorbent would have a metal dispersion value of at least 10 percent as claimed.

### *Response to Arguments*

The argument that it is apparent from the large number of modifications to Yamamoto et al. that were necessary, that Yamamoto et al. is inadequate as a component of the combination of references cited by Examiner is not persuasive because the Yamamoto reference discloses a process for removing vinyl acetylene from styrene as claimed and the examiner has relied upon the Kaminsky reference to teach the claimed catalyst (e.g., surface area; palladium and its amount) which is known in the art to provide excellent results. Therefore, the examiner believes that the rejection is valid.

The argument that it is essential to note that there is no disclosure or even suggestion in Kaminsky '517 that the method disclosed therein could be used to purify styrene or any vinyl aromatic compound by removing therefrom phenylacetylene or any aromatic acetylene compound is not persuasive. Kaminsky teaches that the adsorbent can be used in a process for separating acetylene having a hydrocarbon group of up to 10 carbon atoms from unsaturated hydrocarbon compounds which include at least one vinyl group (see col. 7, lines 1-27). Given the teaching of Kaminsky, it would be expected that the adsorbent of Kaminsky would be effective in a process of removing vinyl acetylene from a styrene or vinyl toluene feedstock.

The argument that Kaminsky '517 discusses Yamamoto et al. and teaches away from the method disclosed in Yamamoto is not persuasive because Kaminsky teaches that it is well known that acetylene will react with copper and/or silver to form copper acetylide or silver acetylide and

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both the acetylide of copper and silver are unstable. Given the teaching of Kaminsky, one of skill in the art would modify the adsorbent of Yamamoto by using palladium metal and the adsorbent of Kaminsky because the Kaminsky adsorbent is more stable and does not cause explosion under some conditions. There is no evident that Kaminsky teaches away from Yamamoto.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tam M. Nguyen whose telephone number is (571) 272-1452. The examiner can normally be reached on Monday through Thursday.



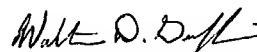
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tam M. Nguyen  
Examiner  
Art Unit 1764

TN

  
Walter D. Griffin  
Primary Examiner